

Hospital Decarbonization : International Climate Obligations and Implementation in Indonesia

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Abstract

Climate change is a global health threat, yet health systems also contribute significantly to greenhouse gas (GHG) emissions. Hospitals, as centers of energy consumption, supply chains and medical waste management, are a critical node in the decarbonization of the health sector. This article analyzes how international climate obligations and global technical standards can be translated into an effective and just national legal framework to drive the transition of hospitals toward net-zero emissions in Indonesia. The research employs a normative juridical method with a comparative approach, examining (i) international climate instruments and the evolving interpretation of state obligations, (ii) sustainability regulation and accountability practices in developed jurisdictions, and (iii) Indonesia's sectoral regulations and guidelines on climate-resilient health facilities. The analysis identifies three major gaps: weak mandates for reporting and emission audit standards for hospitals; fragmented enforcement across health and environmental institutions; and limited capacity and access to transition financing. This article proposes an integrative governance design and a 2025-2045 roadmap that positions measurement-reporting-verification (MRV), carbon economic instruments and the principle of Just Transition as prerequisites for hospital decarbonization without compromising service access and the protection of medical and health workers.

Keywords: *Climate Justice; Comparative Legal Analysis; Hospital Decarbonization; Health Environmental Law; International Climate Obligations; Indonesia; MRV; net-zero emissions.*

1. INTRODUCTION

Climate change is not merely an environmental issue but also a crisis of health and justice. Disease risks are increasing through heatwaves, vector-borne infectious diseases, declining air quality and disruptions to food security. On the other hand, health systems present a paradox: institutions tasked with protecting human health also generate greenhouse gas emissions through energy use, transportation, pharmaceutical and medical device procurement, and waste management. Hospitals, as referral centers with highly energy-intensive operations, are a strategic point for reducing the health sector's carbon footprint.

Health systems account for approximately 4.4 % of global greenhouse gas (GHG) emissions based on 2015 data.¹ This contribution remains significant in Organisation

¹Manfred Lenzen and others, 'The Environmental Footprint of Health Care: A Global Assessment', *The Lancet Planetary Health*, 4.7, (2020) e271-e279. (p.e275), [doi.org/10.1016/S2542-5196\(20\)30121-2](https://doi.org/10.1016/S2542-5196(20)30121-2)

for Economic Co-operation and Development (OECD) countries.² Approximately 36 % of that total is attributable to hospitals.³

Although the decarbonization agenda is advancing rapidly in the energy and industrial sectors, the health sector is still more often positioned as an object of adaptation to disasters and extreme climate rather than as an emission mitigation sector. As a result, hospital emissions have not been consistently regulated through testable targets, reporting obligations and enforcement mechanisms.

Developments in international climate law reinforce the urgency of such regulation. The Advisory Opinion of the International Court of Justice (ICJ) dated 23 July 2025 affirmed that the prevention of climate harm constitutes a due diligence obligation. States must take adequate regulatory action against emissions, including emissions from non-state actors under their jurisdiction. Although the opinion does not directly impose international obligations on hospitals, it strengthens the legal basis for states to translate climate commitments into proportionate sectoral regulation for hospitals.⁴

At the technical implementation level, the World Health Organization (WHO) guidance on climate-resilient health facilities and environmental sustainability provides operational parameters for linking climate policy with health service standards.⁵ However, standards such as sustainability accreditation have not been effectively adopted evenly across developing countries due to cost, limited capacity and the absence of domestic incentives.^{6,7,8}

In the Indonesian context, estimates from Health Care Without Harm and Arup show that the health sector generated 13.6 tons of CO₂e in 2014, equivalent to 1.9 % of total national emissions. This figure is the result of modelling based on national health expenditure data and input-output databases, not a government emissions inventory at the hospital level. Consequently, Indonesia does not yet have standardized data on the sources, magnitude and distribution of hospital emissions based on direct emissions, purchased energy, or the supply chain.⁹

Indonesia has submitted its climate targets through its Nationally Determined Contribution (NDC), aiming to achieve net-zero emissions by 2060 or sooner.¹⁰ The

²OECD, 'Decarbonizing Health Systems Across OECD Countries', (Paris: OECD Publishing, 2025), <https://doi.org/10.1787/5ac2b24b-en>

³Fawzia Rasheed and others, 'Decarbonizing Healthcare in Low and Middle Income Countries: Potential Pathways to Net Zero Emissions', *BMJ*, 375 (2021), n1284, doi.org/10.1136/bmj.n1284

⁴Caroline E. Foster, 'The 2025 International Court of Justice Advisory Opinion on Obligations of States in Respect of Climate Change', (2025) *International and Comparative Law Quarterly*, (FirstView, 6 January 2026) 1-35, <https://doi.org/10.1017/s0020589324000137>

⁵World Health Organization, *WHO Guidance for Climate-Resilient and Environmentally Sustainable Health Care Facilities* (Geneva: WHO, 2020), <https://iris.who.int/bitstream/handle/10665/335909/9789240012226-eng.pdf>

⁶Janina Grabs and others, 'The Effectiveness of Private Sustainability Standards: A Systematic Review of Rigorous Evidence', *Environmental Research Letters*, 18.6 (2023) 063004, <https://doi.org/10.1088/1748-9326/acd207>; International Hospital Federation, 'Accreditation and Certification' in *Geneva Sustainability Centre* (Geneva: IHF, 2025), <https://ihf-fih.org/what-we-do/geneva-sustainability-centre/sustainability-standards/>

⁷European Commission, 'Corporate Sustainability Reporting Directive (CSRD)' (Brussels: European Commission, 2022), <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32022L2464>; Joint Commission International, *Accreditation Standard for Hospitals*, 8th Edition (Oakbrook Terrace: IL: JCI, 2024), <https://store.jointcommissioninternational.org/joint-commission-international-standards-for-hospital-8th-edition/>

⁸Josh Karliner and others, *Global Road Map for Health Care Decarbonization: A Navigational Tool for Achieving Zero Emissions with Climate Resilience and Health Equity* (Reston, VA: Health Care Without Harm, 2021).p.6, 13-15, <https://healthcareclimateaction.org/roadmap>; OECD, 'Measuring Greenhouse Gas Emissions in the Health Sector', (Paris: OECD Publishing, 2025), <https://doi.org/10.1787/59643a96-en>

⁹Health Care Without Harm and Arup, *Topography: Indonesia's Health care Climate Footprint* (2021), menyatakan bahwa emisi bruto sektor kesehatan Indonesia pada tahun 2014 diperkirakan 13,6 juta ton CO₂e atau 1,9 % dari total emisi nasional. Data tersebut berbasis pemodelan menggunakan World Input-Output Database (WIOD) dan data pengeluaran kesehatan nasional tahun 2014.

¹⁰Kementerian Kesehatan Republik Indonesia, *Pedoman Penilaian Fasilitas Kesehatan Berketahanan Iklim dan Lestari Lingkungan di Indonesia* (Jakarta: Kementerian Kesehatan RI, 2020), <https://kemkes.go.id/pedoman-pe->

government has also strengthened environmental planning and the Carbon Economic Value instrument through Government Regulation Number 26 of 2025 and Presidential Regulation Number 110 of 2025. However, this framework has not yet been translated into sectoral obligations for hospitals concerning emission inventory and reporting, energy audits, energy efficiency, green procurement, incentives or sanctions.¹¹

This issue reveals a conflict between the hospital's obligation to guarantee patient safety, quality and continuity of highly energy-intensive services, and the state's obligation to control GHG emissions. While health law remains focused on service provision and waste management, environmental, energy and carbon economic law have not established emission accountability mechanisms for hospitals that are integrated with licensing, accreditation, financing and oversight.

Legal literature remains limited in explaining the translation of international climate obligations into enforceable domestic rules for the hospital sector. The dimension of Just Transition has also not received adequate attention, even though a low-carbon transition must ensure a fair distribution of burdens, protection for health workers, the continuity of universal health coverage (UHC) access, and protection for vulnerable groups.^{12 13}

This article addresses three questions: first, how do international climate obligations and the development of their interpretation form the normative basis for hospital decarbonization? second, why are hospital sustainability standards ineffective in developing countries? (3) how can Indonesian law be reconstructed to promote effective and just hospital decarbonization. This article proposes a governance design that connects international climate obligations, the measurement-reporting-and-verification (MRV) system, the Carbon Economic Value instrument, licensing, accreditation and the principle of Just Transition, through a 2025-2045 legal roadmap.

This research uses a normative juridical method with a comparative legal approach. Primary legal materials include (i) international climate instruments and authoritative documents related to state obligations; (ii) Indonesian national regulations relevant to emission control and carbon economic instruments; and (iii) sectoral health guidelines related to climate resilience and the sustainability of health facilities. Secondary legal materials include academic literature, policy reports and technical standards for measuring/reporting emissions widely used in organizational emission governance.

The comparative approach is used functionally, namely by comparing how other jurisdictions build decarbonization accountability for organizations/facilities through three instruments: (1) information obligations (MRV/reporting), (2) economic instruments (incentives/carbon pricing/green procurement), and (3) enforcement mechanisms (administrative sanctions, linkage with licensing or contract/procurement prerequisites). The unit of analysis in this research is the "hospital as a regulatory

[nilaian-fasilitas-kesehatan-berketahanan-iklim-lestari-dan-lingkungan](#); World Health Organization, *WHO Guidance for Climate-Resilient and Environmentally Sustainable Health Care Facilities* (Geneva: WHO, 2020), <https://iris.who.int/bitstream/handle/10665/335909/9789240012226-eng.pdf>

¹¹Republik Indonesia, *Peraturan Pemerintah Nomor 26 Tahun 2025 tentang Perencanaan Perlindungan dan Pengelolaan Lingkungan Hidup*, *Lembaran Negara Republik Indonesia Tahun 2025 Nomor 96*; Republik Indonesia, *Peraturan Presiden Nomor 110 Tahun 2025 tentang Penyelenggaraan Instrumen Nilai Ekonomi Karbon dan Pengendalian Emisi Gas Rumah Kaca Nasional*, *Lembaran Negara Republik Indonesia Tahun 2025 Nomor 172*.

¹²Katherine Wild and others, 'Balancing Short-Term and Long-Term Climate-Health Equity in Mitigation and Adaptation Strategies', *Journal of Public Health*, 47.1 (2025), e135 - e146, <https://doi.org/10.1093/pubmed/fdae334>

¹³Emily Hough and others, 'Supporting Decarbonization of Health Systems A-Review of National Commitments, Policies and Actions', *BMC Public Health*, 24 (2024), 420, <https://doi.org/10.1186/s12889-024-17917-y>; OECD, *'Decarbonising Health Systems Across OECD Countries'* (Paris: OECD Publishing, 2025), pp. 145 - 157, <https://doi.org/10.1787/5ac2b24b-en>

entity”, covering operational aspects (energy and waste), supply chain aspects, and governance (reporting and audit obligations).

The analysis was conducted through three steps. First, norm mapping to identify the levels of obligation—international, national and sectoral—that could form the basis for hospital emission regulation. Second, gap analysis to assess (i) enforceability, (ii) data accountability (MRV), (iii) institutional capacity, and (iv) the dimension of justice (Just Transition and protection of service access). Third, formulation of a policy design in the form of a 2025-2045 roadmap that combines public law instruments, carbon economic instruments and technical standards, with an implementation focus compatible with the capacity constraints of developing countries.

2. ANALYSIS AND DISCUSSION

2.1 International Legal Framework and Legal Basis for Hospital Decarbonization

Research Question 1: How does the international legal framework regulate hospitals' environmental responsibility for greenhouse gas (GHG) emissions?

The international legal framework for hospital decarbonization rests on three main pillars: the Paris Agreement of 2015, the Advisory Opinion of the International Court of Justice (ICJ) 2025, and World Health Organization (WHO) guidance on climate-resilient and environmentally sustainable health facilities.¹⁴ These three instruments do not create direct international obligations for hospitals, but they form a normative basis for states to regulate, supervise and progressively reduce emissions from the health sector.¹⁵

2.1.1 Paris Agreement and Cross-Sectoral Mitigation Obligations

The Paris Agreement requires states to submit and implement NDCs that reflect ambitious efforts to limit global temperature well below 2°C and pursue efforts to limit it to 1.5°C (Article 2(1)(a) and Article 4(2)).¹⁶ Although the agreement does not explicitly mention the “health sector” or “hospitals”, the obligation to “take domestic mitigation measures” (Article 4(2)) is economy-wide and covers all significant sources of emissions under a state’s jurisdiction, without sectoral exception.¹⁷ The ICJ Advisory Opinion 2025 reinforces this interpretation by affirming that states may be held responsible for failing to regulate emissions from private actors, including health facilities.¹⁸

¹⁴World Health Organization, *WHO Guidance for Climate-Resilient and Environmentally Sustainable Health Care Facilities* (Geneva: WHO, 2020), pp. 25 – 43, <https://iris.who.int/bitstream/handle/10665/335909/9789240012226-eng.pdf>

¹⁵Caroline E. Foster, ‘The 2025 International Court of Justice Advisory Opinion on Obligations of States in Respect of Climate Change’, *International and Comparative Law Quarterly*, FirstView (published online 4 January 2026), pp. 14 – 18, <https://doi.org/10.1017/s0020589324000137>; Emma Less and Jorge E. Vinuales, ‘Historic International Court of Justice Opinion Confirms States’ Climate Obligations’, IISD (23 July 2025), <https://www.iisd.org/articles/deep-drive/icj-advisory-opinion-climate-change>

¹⁶United Nations, *Paris Agreement* (adopted 12 December 2015, entered into force 4 November 2016) UNTS 3156, Articles 2(1)(a) and 4(2), <https://unfccc.int/process-and-meetings/the-paris-agreement>

¹⁷Daniel Bodansky, ‘The Legal Character of the Paris Agreement’, *Review of European, Comparative & International Environmental Law*, 25.2 (2016), 142 – 150 (p. 143), <https://doi.org/10.1111/reel.12154>; Benoit Mayer, ‘Article 4: Mitigations’, in *The Paris Agreement on Climate Change: Analysis and Commentary*, eds. Daniel Klein and others, (Oxford: Oxford University Press, 2017), pp. 103 – 120, paras 4.09 – 4.12, 4.18 <https://benoitmayer.com/wp-content/uploads/2021/03/PA-art-4-commentary.pdf>

¹⁸International Court of Justice, *Obligations of States in Respect of Climate Change (Request for Advisory Opinion)*, Advisory Opinion of 23 July 2025, ICJ Reports 2025, paras 428, <https://www.icj-icj.org/case/187>; Caroline E. Foster, ‘The 2025 International Court of Justice Advisory Opinion on Obligations of States in Respect of Climate Change’, *International and Comparative Law Quarterly*, FirstView (published online 4 January 2026), pp. 14 – 18, <https://doi.org/10.1017/s0020589324000137>

In this context, hospitals are relevant as objects of mitigation because of their high energy intensity and supply chains. However, as explained in the introduction, the health sector in many countries is still predominantly positioned as an adaptation sector rather than a mitigation sector. Consequently, NDCs generally do not yet contain specific hospital emission reduction targets.^{19 20}

Obligations under the Paris Agreement are obligations of conduct: states must take serious, progressive steps commensurate with their capacity to achieve the mitigation objective. States retain discretion in determining instruments, but that discretion does not justify neglecting significant and technically controllable sources of emissions. Therefore, hospital decarbonization can be positioned as part of the fulfillment of domestic mitigation obligations, particularly through the regulation of energy, procurement, waste, buildings and the health supply chain.

Best practice in translating Paris Agreement obligations into sectoral mandates for hospitals is found in the United Kingdom's National Health Service (NHS). Through Delivering a 'Net Zero' National Health Service and reinforcement via the Health and Care Act 2022, the NHS became the first health system to embed a net-zero emissions target into a legislative framework, with an obligation to achieve net-zero emissions for directly controlled emissions by 2040 and supply chain emissions by 2045.²¹ Further, through the NHS Net Zero Supplier Roadmap, starting in 2030 the NHS will only contract with suppliers who can demonstrate commitment and progress toward net zero, thereby driving systemic decarbonization throughout the health supply chain.²²

2.1.2 Advisory Opinion of the International Court of Justice (ICJ) 2025: Strengthening States' Legal Obligations

The ICJ Advisory Opinion of 23 July 2025 clarifies that state obligations regarding climate change derive from applicable international law, particularly the obligations of prevention and due diligence.²³ This opinion is significant because it affirms that climate action is not merely a policy commitment but pertains to a state's legal obligation to prevent significant environmental harm.²⁴

¹⁹Josh Karliner and others, *Health Care's Climate Footprint: How the Health Sector Contributes to the Global Climate Crisis and Opportunities for Action* (Reston, VA: Health Care Without Harm & Arup, 2019), p. 6, [https://global.no-harm.org/sites/default/files/dokumens-files/5961/HealthcaresClimate Footprint092319.pdf](https://global.no-harm.org/sites/default/files/dokumens-files/5961/HealthcaresClimate%20Footprint092319.pdf); Marina Romanello and others, 'The 2022 Report of the Lancet Countdown on Health and Climate Change; Health at the Mercy of Fossil Fuels', *The Lancet*, 400.10363 (2022), 1619 - 1654 (p. 1643) [https://doi.org/10.1016/s0140-6736\(22\)01540-9](https://doi.org/10.1016/s0140-6736(22)01540-9)

²⁰Bipartisan Policy Center, *Cleaner Health care, Hospital Emissions Mitigation* (Washington, D.C.: Bipartisan Policy Center, 2023), <https://bipartisanpolicy.org/report/cleaner-health-care-hospital-emissions-mitigation/>; Andrew Abel and others, 'Emissions Disclosures and Energy Use Reporting by Hospitals in the United States', *INQUIRY: The Journal of Health care Organization, Provision and Financing*, 61 (2024), <https://doi.org/10.1177/00469580241304309>; Matthew J. Eckelman and others, 'Health care Pollution and Public Health Damage in the United States: An Update', *Health Affairs*, 39.12 (2020), 2071-20179, <https://doi.org/10.1377/hlthaff.2020.01247>

²¹NHS England, *Delivering a 'Net Zero' National Health Service* (London: NHS England, 2020), pp. 6 - 9, <https://www.england.nhs.uk/greennhs/wp-content/uploads/sites/51/2020/10/delivering-a-net-zero-national-health-service.pdf>; NHS England, 'National Ambition: Our Journey to Next Zero' (2021), <https://www.england.nhs.uk/greennhs/national-ambition/>; NHS Knowledge and Library Services, 'NHS and Sustainability' (7 may 2025), <https://library.hec.nhs.uk/about/sustainability/sustainability/nhs-and-sustainability>

²²NHS England, *Building Net Zero into NHS Procurement - The Supplier Roadmap* (London: NHS England, last updated August 2022), <https://www.lpp.nhs.uk/media/477397/Net-Zero-Supplier-Roadmap-doc.pdf>; NHS England, 'Carbon Reduction Plan and Net Zero Commitment for the Procurement of NHS Goods, Services and Works' (13 february 2023), <https://www.england.nhs.uk/long-read/carbon-reduction-plan-requirements-for-the-procurement-of-nhs-goods-services-and-works/>

²³International Court of Justice, *Obligations of States in Respect of Climate Change (Request for Advisory Opinion)*, Advisory Opinion of 23 July 2025, ICJ Reports 2025, paras 131 - 138, 273, 294, <https://www.icj-cij.org/case/187>

²⁴Caroline E. Foster, 'The 2025 International Court of Justice Advisory Opinion on Obligations of States in Respect of Climate Change', *International and Comparative Law Quarterly*, FirstView (published online 4 January 2026), pp. 7 - 9, 14 - 18, <https://doi.org/10.1017/s0020589324000137>;

First, the ICJ affirms that a state is responsible for emissions generated by non-state actors, including private hospitals, under its jurisdiction.²⁵ This means a state cannot disregard hospital emissions on the grounds that the facility is a private entity or that health services are a priority that supersedes climate obligations. Second, a state's failure to regulate emissions through licensing, standards, or other instruments is qualified as a wrongful act under international law.²⁶ Third, a state's discretion in formulating its NDC is not unlimited; the NDC must align with the due diligence obligation to limit warming to 1.5 °C.²⁷ This means an NDC that excludes the health sector from mitigation targets could be considered as failing to meet the due diligence standard.²⁸ Fourth, climate protection is established as an *erga omnes* obligation, granting every state the right to demand accountability for failures in decarbonization in key sectors.²⁹

The legal consequences of violating this obligation include the obligation of cessation, guarantees of non-repetition, and full reparation. In the context of hospitals, the ICJ ruling strengthens the legal basis for the claims that: (i) governments are obliged to establish hospital emission standards or emission reporting requirements; (ii) failure to do so may trigger domestic climate litigation based on human rights or the right to a healthy environment; and (iii) developing countries have a stronger legal basis to demand access to climate financing from developed countries to fund the green transformation of hospital infrastructure, based on the principle of Common But Differentiated Responsibilities and Respective Capabilities (CBDR-RC), which was also reaffirmed by the ICJ.

2.1.3 Impact of International Climate Obligations on Indonesia

The legal impact of international climate obligations on Indonesia must be understood through a multi-tiered translation process. First, Indonesia has ratified the Paris Agreement through Law Number 16 of 2016. This ratification places Indonesia as a party obliged to prepare, submit, maintain and implement its Nationally Determined Contribution (NDC) and to take domestic mitigation measures to achieve the objectives of the Paris Agreement. Therefore, national climate targets are not merely political

²⁵International Court of Justice, *Obligations of States in Respect of Climate Change (Request for Advisory Opinion)*, Advisory Opinion of 23 July 2025, ICJ Reports 2025, paras 428, <https://www.icj-cij.org/case/187>; harro van Asselt, 'The Private Life of the ICJ Advisory Opinion on Climate Change', *Volkserrechtblog* (14 Agustus 2025), <https://voelkerrechtsblog.org/the-private-life-of-the-icj-advisory-opinion-on-climate-change/>

²⁶International Court of Justice, *Obligations of States in Respect of Climate Change (Request for Advisory Opinion)*, Advisory Opinion of 23 July 2025, ICJ Reports 2025, paras 131 – 138, 273, 294, <https://www.icj-cij.org/case/187>; Francesca Romannin Jacur, 'Climate Change and Corporate Accountability: What the ICJ Advisory Opinion Means for Business and Human Right', *Business and Human Rights Journal Blog* (26 August 2025), <https://bhri.blog/2025/08/27/climate-change-and-corporate-accountability-what-the-icj-advisory-opinion-means-for-business-and-human-rights/>

²⁷International Court of Justice, *Obligations of States in Respect of Climate Change (Request for Advisory Opinion)*, Advisory Opinion of 23 July 2025, ICJ Reports 2025, paras 245 – 246, <https://www.icj-cij.org/case/187>; Benoit Mayer, "Doing the utmost": Due diligence as the standard of conduct in international climate law', *Columbia Law School Climate law Blog* (2 September 2025), <https://blogs.law.columbia.edu/climatechange/2025/09/03/doing-the-utmost-due-diligence-as-the-standard-of-conduct-in-international-climate-law/>

²⁸Carbon Brief, 'What the World Court's Landmark Opinion Means for Climate Change' (27 July 2025, <https://www.carbonbrief.org/icj-what-the-world-courts-landmark-opinion-means-for-climate-change/>

²⁹International Court of Justice, *Obligations of States in Respect of Climate Change (Request for Advisory Opinion)*, Advisory Opinion of 23 July 2025, ICJ Reports 2025, para 436, <https://www.icj-cij.org/case/187>; Delta Marner, 'Five Reasons Why the ICJ Climate Advisory Opinion Matters', *Union of Concerned Scientists Blog* (22 July 2025), <https://blog.ucs.org/delta-marner/five-reasons-why-the-icj-climate-advisory-opinion-matters/>; Caroline E. Foster, (2026), pp 28 – 31); maria Antonia Tigre, 'The ICJ's Historic Advisory Opinion: A New Era for Climate Justice?', *Sciences Po Chair for Sustainable Development* (24 August 2025), <https://www.sciencespo.fr/psia/chair-sustainable-development/2025/08/25/the-icjs-historic-advisory-opinion-a-new-era-for-climate-justice/>

statements but must be translated into effective regulatory, administrative, fiscal and sectoral action.

Second, the ICJ Advisory Opinion of 2025 clarifies that a state's mitigation obligation includes measures to prevent climate harm through strict due diligence standards. In the context of emissions produced by private business entities or institutions, a state cannot relinquish responsibility merely because the emission source is a non-state actor. States are obliged to reasonably use available means, including establishing regulations, oversight, law enforcement, risk assessment and compliance monitoring, to limit emissions from private actors under their jurisdiction.

Third, the consequence for Indonesia is not the emergence of an international obligation that directly burdens hospitals to achieve net-zero emissions. The direct obligation rests with the state, while obligations for hospitals must be established through national law and sectoral regulation. Nevertheless, the ICJ Advisory Opinion provides an interpretive basis that Indonesia needs to consider hospital emissions as part of the emission sources under its jurisdiction, particularly if such emissions are significant, measurable, and reducible through available technology or policy. In other words, the absence of hospital emission regulation does not automatically prove a violation of international obligations, but it may indicate a weakness in meeting due diligence standards if the state has no data-, risk- or capacity-based justification for disregarding the sector.

Fourth, the due diligence obligation is proportional and contextual. Indonesia is not required to copy the decarbonization models of developed countries or immediately impose carbon trading obligations on all hospitals. However, Indonesia is required to take reasonable, progressive and evidence-based measures commensurate with national capacity, risk levels, scientific developments and the need to protect the right to health. In the hospital sector, such measures can begin with standardized emission inventories, phased reporting for large and referral hospitals, integration of emission indicators into accreditation and licensing, and financing incentives for energy efficiency and low-carbon technology.

Thus, the influence of international law on Indonesia is directive and reinforcing of state regulatory obligations, rather than replacing the authority of the legislature or government in determining national policy design. Legal reconstruction of hospital decarbonization is needed to link international climate obligations, NDC targets, the Carbon Economic Value instrument and hospital service standards into measurable, enforceable domestic obligations that do not reduce public access to health services.

2.1.4. WHO Guidance: Authoritative Soft Law for Technical Implementation

The World Health Organization (WHO) plays a central role through soft law instruments that provide technical and operational standards for integrating health into the climate adaptation and mitigation agenda. WHO's principal guidance, WHO Guidance for Climate-Resilient and Environmentally Sustainable Health Care Facilities (CRESHCF), bridges global-level political commitments with technical practices at health facilities.³⁰ This document provides a framework for building climate-resilient, low-emission health facilities, covering: (i) understanding additional health risks resulting from climate change; (ii) monitoring, anticipating and managing climate risks while reducing environmental impact; (iii) strengthening and improving facility

³⁰World Health Organization, *WHO Guidance for Climate-Resilient and Environmentally Sustainable Health Care Facilities*, (Geneva: WHO, 2020), pp. v - vi, <https://iris.who.int/bitstream/handle/10665/335909/9789240012226-eng.pdf>

efficiency; and (iv) climate resilience and environmental sustainability assessment tools at the facility level.³¹

WHO has also published the Quality Criteria for Integrating Health into NDCs, which include: (i) leadership and cross-sectoral coordination; (ii) health-sector-specific adaptation and mitigation strategies; (iii) emission reduction targets for the health sector (particularly for high-emitting countries); (iv) financing and resource mobilization mechanisms; and (v) monitoring and evaluation systems with clear indicators.³² These criteria make WHO guidance not merely a technical recommendation but also an accountability matrix for national health climate policy.

Countries that have integrated WHO criteria into their NDCs, such as Laos, which made health the only sector with a results-based adaptation framework in NDC 3.0, demonstrate that adoption strengthens the credibility and coherence of health climate policy.³³ Laos has further reinforced this commitment by developing a Health National Adaptation Plan (H-NAP) aligned with WHO criteria.³⁴

2.1.5 Critical Gaps in the Normative Architecture

Although the international legal architecture has been established, there are four major gaps that hinder its effectiveness in driving hospital decarbonization.

a) Sectoral coverage gap

Most NDCs do not explicitly contain health-sector emission targets. Indonesia's Enhanced NDC (2022) targets an unconditional emission reduction of 31.89 % and a conditional reduction of 43.20 % by 2030.³⁵ However, the health sector is only positioned as an adaptation priority without a quantitative mitigation target for hospitals.³⁶ Globally, only 11 % of NDCs incorporate health-sector emission reduction commitments, and the primary focus remains on adaptation rather than mitigation from the health system itself.

b) Enforceability gap

The Paris Agreement's compliance mechanism, which is facilitative and non-punitive (Article 15), is often not strong enough to compel states to regulate hospital

³¹World Health Organization (2020), pp. 2, 21 – 26; Relief Web, 'WHO Guidance for Climate Resilient and Environmentally Sustainable Health Care Facilities' (12 October 2020), <https://reliefweb.int/report/world/who-guidance-climate-resilient-and-environmentally-sustainable-health-care-facilities>

³²World Health Organization, Quality Criteria for Integrating Health into Nationally Determined Contributions (NDCs), (Geneva: WHO, 2024), pp. 10 – 32, <https://cdn.who.int/media/doc/default-source/environment-climate-change-and-health/quality-criteria-for-integrating-health-in-ndcs.pdf>; NDC Partnership, 'Quality Criteria for Integrating Health into Nationally Determined Contributions (NDCs)' (30 November 2024), <https://ndcpartnership.org/knowledge-portal/climate-toolbox/quality-criteria-integrating-health-nationally-determined-contributions>

³³Government of Lao PDR, *Nationally Determined Contribution (NDC) 2.0* Vientiane: Government of Lao PDR, 2021), pp. 26 – 29, [https://unfccc.int/sites/default/files/NDC/2022-06/NDC%2020%20of%20Lao%20PDR520\(English\)%2009%20April%202021%20\(1\).pdf](https://unfccc.int/sites/default/files/NDC/2022-06/NDC%2020%20of%20Lao%20PDR520(English)%2009%20April%202021%20(1).pdf); ATACH Community, 'Lao PDR: Integration of Health in NDCs' (11 November 2025), <https://www.atachcommunity.com/our-impact/case-studies/lao-pdr-integration-of-health-in-ndcs/>

³⁴WHO Lao PDR, 'Lao PDR Strengthens Health Commitments to Climate Change in Nationally Determined Contributions (NDC 3.0)' (2 August 2025), [https://www.who.int/laos/news/detail/03-08-2025-lao-pdr-strengthens-health-commitments-to-climate-change-in-nationally-determined-contributions-\(ndc.30\)](https://www.who.int/laos/news/detail/03-08-2025-lao-pdr-strengthens-health-commitments-to-climate-change-in-nationally-determined-contributions-(ndc.30)); ATACH Community (2025); Government of Lao PDR, *Health National Adaptation Plan (H- NAP)* (Vientiane: Ministry of Health, 2024), https://www.atachcommunity.com/fileadmin/uploads/atach/Documents/Country_documents/LAO_HNAP_2024.pdf

³⁵Republik of Indonesia, Enhanced Nationally Determined Contribution (Jakarta: Ministry of Environment and Forestry, 2022), pp. 2 – 2, https://unfccc.int/sites/default/files/NDC/2022-09/23.09.2022_Enhanced%20NDC%20Indonesia.pdf

³⁶Republik of Indonesia, Enhanced Nationally Determined Contribution (Jakarta: Ministry of Environment and Forestry, 2022), pp. 10 – 11, Annex2, https://unfccc.int/sites/default/files/NDC/2022-09/23.09.2022_Enhanced%20NDC%20Indonesia.pdf

emissions except through the impetus of domestic climate litigation that uses the 2025 ICJ Advisory Opinion as a legal basis.³⁷ At the national level, many developing countries have environmental regulations that are comprehensive de jure but weak de facto, due to limited oversight capacity, fragmentation of authority across ministries, and the absence of effective administrative sanctions for hospitals that fail to meet environmental standards.³⁸

c) Climate finance gap

Although the Paris Agreement (Article 9) and the CBDR-RC principle require developed countries to support developing countries through climate financing, climate fund allocation for health-sector mitigation remains less than 1 % of total global climate financing.³⁹ Green Climate Fund (GCF)-funded health projects, such as those in Laos (2023) and Malawi (2024), focus almost exclusively on adaptation and health system resilience, with emission reduction only as a secondary co-benefit without a binding decarbonization target.⁴⁰

d) Technical capacity and data gap

The Paris Agreement's Enhanced Transparency Framework (ETF) (Article 13) requires national emission inventories and NDC progress tracking, which necessitates disaggregated sectoral emission data down to the facility level. Hospitals should ideally be required to report emissions using standard methodologies such as the GHG Protocol (Scope 1: direct emissions from fuel combustion and operations; Scope 2: indirect emissions from purchased electricity and energy; Scope 3: supply chain, travel and waste emissions). However, systematic hospital emission data remains very limited in developing countries. In Indonesia, there is no specific mandate for GHG emission reporting by hospitals within the national regulatory framework, unlike the industrial sector, which has been integrated into an emissions monitoring system.⁴¹

Partial conclusion for RQ1: The Paris Agreement, the ICJ Advisory Opinion and WHO guidance provide a normative and technical basis for hospital decarbonization. However, implementation is still constrained by the absence of sectoral targets, weak enforcement, limited financing and a deficit of emission data. For Indonesia, the implication is the need to build a hospital MRV system and translate climate commitments into licensing, accreditation, financing and operational standards that are proportional and just.

³⁷Paris Agreement (adopted 12 Desember 2015) entered into force 4 November 2016) UNTS 3156, Article 15, <https://unfccc.int/process-and-meeting/the-paris-agreement>; Jessica Owley, 'The Paris Agreement Compliance Mechanism', *University of Miami International and Comparative Law Review*, 11.1 (2021), 152-171 (pp. 155 - 158), https://repository.law.miami.edu/cgi/viewcontent.cgi?article=2034&context=fac_articles

³⁸Adeniran and others (2023), pp. 39 – 42, *Journal of Environmental Management*, 250 (2019), 109505, <https://doi.org/10.1016/j.jenvman.2019.109505> *Regulation & Governance*, 19.4 (2025), 1081 – 1100, <https://doi.org/10.1111/rego.12615>

³⁹World Health Organization, *Draft Global Action Plan on Climate Change and Health* (Geneva: WHO, 2025), para 32, https://apps.who.int/gh/cbwha/pdf_files/WHA78/A78_A78_4Add2-en.pdf; Darragh Hare and Max Harwood, 'Financing Climate Change Adaptation in the Healthcare Sector', *Yale Global Health Review* (17 May 2025), <https://yaleglobalhealthreview.com/2025/05/18/financing-climate-change-adaptation-in-the-healthcare-sector/>

⁴⁰Green Climate Fund, 'SAP030: Strengthening Climate Resilience of the Lao Health System – Project Document' (October 2023), Section E.6.1 (*Co-benefits*), <https://www.greenclimate.fund/project/sap030>; Green Climate Fund, 'FP244: Climate Resilient Health and Well-Being for Rural Communities in Southern Malawi – Funding Proposal' (October 2024), Section E.6 (Expected Performance Against Investment Criteria), <https://www.greenclimate.fund/project/fp244>

⁴¹SSEK Law Firm, 'Climate Regulation in Indonesia' (18 September 2023), pp. 3 – 5;; PwC Indonesia, *Indonesia Carbon Market White Paper* (Jakarta: PwC, 2024), p. 7, <https://www.pec.com/id/en/publications/esg/indonesia-carbon-market-white-paper.pdf>.

2.2 Implementation Gap of Sustainability Standards in Developing Countries

Research Question 2: What are the fundamental legal challenges in implementing hospital sustainability standards in developing countries?

The implementation of hospital sustainability standards in developing countries faces multidimensional challenges that go beyond technical aspects. This analysis identifies three main structural obstacles: the paradox between law and enforcement reality, a crisis of access to climate financing, and limitations in institutional capacity and basic infrastructure.

2.2.1 Regulatory Paradox: Comprehensive De Jure, Weak De Facto

Developing countries generally already have fairly complete environmental legal frameworks, but their implementation is often weak. In Indonesia, Law No. 32 of 2009 on Environmental Protection and Management (UUPPLH) regulates the AMDAL and UKL-UPL instruments as well as hazardous waste (B3) management. Government Regulation Number 22 of 2021 and Minister of Health Regulation Number 7 of 2019 also regulate hospital environmental health requirements and medical waste management.⁴²

However, these regulations are primarily focused on environmental permits and waste, not yet on the systematic control of hospital GHG emissions. The environmental planning and Carbon Economic Value frameworks have indeed been strengthened through Government Regulation Number 26 of 2025 and Presidential Regulation Number 110 of 2025, but these have not yet been translated into sectoral obligations for hospitals regarding emission inventory, reporting, verification, or reduction. Thus, there is a gap between generally applicable environmental regulation and the need for carbon governance specific to health facilities.

Weak implementation is influenced by limited oversight capacity, cross-institutional coordination, and the sensitivity of health services. Environmental oversight agencies often face limitations in personnel, budget and monitoring tools. In addition, hospital oversight is spread across the Ministry of Health, the ministry responsible for the environment, local governments and accreditation bodies, blurring lines of accountability. Sanctions against hospitals are also often seen as risking disruption to access to health services. Therefore, enforcement needs to be designed in stages through guidance, corrective obligations, compliance incentives and proportional sanctions for repeated violations.^{43,44}

2.2.2 Financing Limitations

Hospital decarbonization requires large upfront investment for energy efficiency, cooling system replacement, renewable energy installation, low-emission waste

⁴²Megawati N. Kesek, 'The Role of Environmental Law in Addressing Climate Change in Indonesia: An Assessment of Enforcement Mechanisms and Compliance Behavior', *Indonesian Journal of Business Law and Entrepreneurship*, 6.2 (2025), 1265 – 1293 (pp. 1270, 1276 – 1278), <https://ijble.com/index.php/journal/article/download/1179/1044>; Shinta R. Marsinta, 'Environmental Democracy as an Instrument for Enforcing Green Justice: Comparative Analysis between Indonesia and India', in *Proceedings of the 3rd International Conference on Law and Society* (Amsterdam: Atlantis Press, 2025), pp. 70 – 76 (p. 74), <https://www.atlantis-press.com/article/126019912.pdf>

⁴³Adeyemi A. Adeniran and others, 'The Enforcement of Environmental Laws in Developing Countries: Challenges and Prospects', *Journal of Business and Social Science Review*, 4.6 (2023), 34 – 52 (pp. 37 – 39), <https://bpasjournals.com/library-science/index.php/journal/article/download/1168/2226/4997>

⁴⁴World Bank, *Environmental and Social System Assessment (ESSA): Indonesia – Supporting Primary Health Care Reform* (Washington, D.C.: World Bank, 2018), PP. 31, 45 – 47, <https://documents1.worldbank.org/curated/en/977011522748981704/pdf/Environmental-and-social-system-assessment.pdf>; CRPG Indonesia, 'Medical and Institutional Waste: Indonesia's Specific Waste Framework under PP 27/2020' (16 December 2025). <https://crpg.info/medical-and-institutional-waste-indonesia-specific-waste-frameworks/>

management technology and emission measurement systems. However, the health sector still has limited access to international climate financing. Health organizations are generally not accredited entities that can directly channel funds from the Green Climate Fund (GCF), while the accreditation process requires financial governance, environmental and social safeguards, and gender policy capacities that health institutions do not have.^{45 46}

Health-sector climate financing is also still directed more toward adaptation, such as facility resilience, disaster preparedness and control of climate-related diseases. Examples of GCF projects in Laos and Malawi show that emission reduction is often positioned as a co-benefit, not a mitigation target with its own indicators, funding, and MRV mechanism.⁴⁷ This condition makes it difficult for hospitals in developing countries to finance a low-carbon transition, particularly for building retrofits, efficient HVAC systems, solar panels, and clean waste treatment.⁴⁸

2.2.3 Technical Capacity and Basic Infrastructure Deficit

Developing countries face acute operational constraints in three dimensions. First, a participation gap: the health sector is marginalized in national climate policy.⁴⁹ A “siloe” approach and lack of understanding of co-benefits (the dual benefits of emission reduction and improved air quality/health) causes health to lag far behind sectors such as agriculture or water in accessing adaptation funding.⁵⁰ Most NDCs indeed mention health impacts of climate change (e.g., vector-borne diseases, heatwaves) rather than health as a sector that needs to decarbonize its own operations.⁵¹

Second, an energy infrastructure deficit: a study of 78 LMICs shows that 59 % of health facilities do not have reliable energy services, forcing reliance on polluting and expensive diesel generators.⁵² Even when connected to the grid, the carbon intensity of the grid in many developing countries is often higher than in developed countries (due to the dominance of coal or diesel in the national energy mix), so electrifying hospitals does not automatically reduce emissions without a supply-side energy transition.⁵³

Third, the absence of credible emission data: without a specific emission reporting mandate in national regulation, the sector’s contribution remains invisible.⁵⁴ In

⁴⁵Green Climate Fund, *Annex IV: Accreditation Framework of the GCF* (Decision B.31/14, October 2024), paras 17 – 20, 48 – 51, <https://www.greenclimate.fund/sites/default/files/decision/b31/decision-b31-06-b31-a04.pdf>

⁴⁶OECD, ‘Decarbonising Health System Across OECD Countries’ (Paris: OECD Publishing, 2025), pp. 145 – 157, <https://doi.org/10.1787/5ac2b-en>

⁴⁷Green Climate Fund, ‘FP224: Climate Resilient Health and Well-Being for Rural Communities in Southern Malawi’ (approved 22 October 2024), <https://www.greenclimate.fund/project/fp244>; Save the Children UK, ‘major New Programme to Support a Fifth of Southern Malawi’s Population to Tackle Climate-Induced Health Risks’ (22 October 2024), <https://www.savethechildren.org.uk/news/media-centre/press-releases/2024/major-new-climate-programme-in-malawi-announced>

⁴⁸Muhammad Azhar Raza and others, ‘Managing the Low Carbon Transition Pathways through Solid Waste Electricity’, *Scientific Reports*, 14 (2024), 5225, Table 2, <https://doi.org/10.1038/s41598-024-55283-9>

⁴⁹Shyam Khanal and others, ‘Exploring Barriers and Facilitators to Integrating Health Equity within Climate Change-Related Policies at the Federal Level in Nepal’, *Environmental Health*, 24 (2025), 42, pp. 6 – 8, <https://doi.org/10.1186/s12940-025-01230-y>

⁵⁰Khanal and others, (2025), pp. 6 – 7, 11 – 12

⁵¹World Health Organization, *2023 WHO Review of Health in Nationally Determined Contributions and Long-Term Strategies* (Geneva: WHO, 2023), pp. x, 6 – 8, https://cdn.who.int/media/docs/default-source/climate-change/9789240074729-v2.pdf?sfvrsn=f4c8b157_4

⁵²Aisha Khogali and others, ‘The Impact of Electrification on Health Outcomes in Low – and Middle-Income Countries: A Systematic Review’, *Health & Place*, 74 (2022), 102766, p.2, <https://doi.org/10.1016/j.health-place.2022.102766>

⁵³International Energy Agency, *Life Cycle Upstream Emission Factors 2024* Paris: IEA, 2024), p. 3, https://iea.blob.core.windows.net/assets/62c02614-3753-48f6-b5f8-2206ecf356f0/IEAupstreamlifecycleemissionfactors_2024.pdf

⁵⁴Pawzia Niat Rasheed and others, ‘Decarboning Healthcare in Low and Middle Income Countries: Potential Pathways to Net Zero Emissions’, *BMJ*, 375 (2021), n1284, <https://doi.org/10.1136/bmj.n1284>

Indonesia, the Ministry of Health Guideline on the Assessment of Climate-Resilient and Environmentally Sustainable Health Facilities (CRESHCF) provides a self-assessment tool but is not yet integrated with mandatory licensing or accreditation systems. This is exacerbated by limited access to standard methodologies (the GHG Protocol) and expensive monitoring technology, as well as a lack of experts trained in hospital emission audits.⁵⁵

2.2.4 Trade-Off Dilemma: Universal Health Coverage vs. Decarbonization

Developing countries face a complex ethical and policy dilemma: balancing the expansion of Universal Health Coverage (UHC) with mitigation obligations.⁵⁶ To achieve SDG 3 (Good Health and Well-being) targets, it is estimated that 415,000 new health facilities need to be built in developing countries.⁵⁷ This expansion risks significantly increasing emissions if built using conventional, carbon-intensive models (relying on diesel generators, inefficient HVAC systems, and emission-intensive pharmaceutical/medical device supply chains). However, this expansion simultaneously offers a strategic opportunity to build infrastructure that is “zero carbon by design”, which in the long term can provide operational cost savings (through energy efficiency and the use of renewable energy) and significant public health benefits (through the reduction of local air pollution).⁵⁸

2.2.5 Gap in Global Standard Adoption: JCI Edition 8

The Joint Commission International (JCI) launched the Accreditation Standards for Hospitals, 8th Edition (effective July 2024), which introduces the Global Health Impact (GHI) Chapter, the first environmental sustainability standard assessed in JCI accreditation. The GHI chapter focuses on five key areas: (i) governance, emission tracking and reporting; (ii) employee engagement and empowerment; (iii) use of environmental resources, green operations and processes; (iv) procurement and supply chain; and (v) infrastructure and service resilience.

Although JCI offers a strong sustainability governance framework integrated with quality and patient safety standards, adoption of this standard faces significant obstacles in developing countries. First, accreditation cost: JCI accreditation costs, including survey, consultation, and preparation fees, can reach tens to hundreds of thousands of US dollars, which is unaffordable for most public and small-to-medium hospitals in developing countries. Second, technical capacity: implementing the GHI chapter requires an emission data management system, personnel trained in energy and supply chain audits, and infrastructure investment (e.g., real-time energy monitoring systems), which are often unavailable. Third, lack of domestic incentives: without a regulatory mandate or government incentives, hospitals have no strong motivation to pursue JCI GHI accreditation, especially if domestic accreditation (e.g., the Hospital Accreditation

⁵⁵Charlotte Quitmann and others, ‘Assessing Greenhouse Gas Emissions in Hospitals: Methodological Challenges and Solutions’, *The Journal of Climate Change and Health*, 21 (2025), 100364, pp. 3 – 5, <https://doi.org/10.1016/j.joclim.2024.100364>; OECD, *Measuring Greenhouse gas Emission in the Health Sector* (Paris: OECD Publishing, 2025), pp. 15 – 22, <https://doi.org/10.1787/59643a96-en>

⁵⁶Anant Bhopal and others, ‘Fair pathways to Net-Zero Healthcare’, *Nature Medicine*, 29 (2023), 1087 – 1093 (pp. 1087 – 1089), <https://doi.org/10.1038/s41591-023-02351-2>

⁵⁷Devex, ‘Here’s How Much Is Needed to Meet SDGs’ Global Health Targets by 2030’ (20 July 2027), <https://www.devex.com/news/here-s-how-much-is-needed-to-meet-sdgs-global-health-targets-by-2030-90693>; World Health Organization, *Primary Health care on the Road to Universal Health Coverage: 2019 Global Monitoring Report* (Geneva: WHO, 2019), pp. 8 – 11, <https://www.who.int/docs/default-source/documents/2019-uhc-report.pdf>

⁵⁸Bhopal and others (2023), pp. 1088 – 1089, Figure 2

Commission/KARS in Indonesia) has not yet integrated equivalent sustainability standards.

Data shows that the implementation of the green hospital concept in Indonesia remains very minimal: fewer than 1 % of hospitals actively implement comprehensive sustainability practices. This gap underscores the need for strong state regulatory intervention to bridge global standards with local capacity, through strengthening emission reporting legislation, mobilizing inclusive climate financing, and building the technical capacity of health workers.

Partial conclusion for RQ2: The implementation of hospital sustainability standards in developing countries is hindered by weak regulatory enforcement, limited climate financing, infrastructure and technical capacity deficits, and the dilemma between UHC expansion and emission mitigation. Private standards such as JCI GHI can serve as a reference but do not replace the state's role. Therefore, the reconstruction of Indonesian law needs to integrate emission MRV into licensing and accreditation, provide transition financing, and build institutional capacity gradually.

2.3 Legal Reconstruction and Roadmap for Hospital Decarbonization in Indonesia

Research Question 3: How can Indonesian law be reconstructed to promote an effective and just transformation toward net-zero emissions for hospitals?

The legal reconstruction of hospital decarbonization requires the integration of three main instruments: direct regulation (command and control), economic incentives (market-based instruments), and information instruments (transparency and disclosure), framed by the principle of Just Transition to ensure that the transformation does not compromise access to health services and the protection of health workers. This framework is structured as a phased 2025-2045 roadmap that is realistic for the context of developing countries.

2.3.1 Hospital Emission Profile and Indonesia's Data Gap

Indonesia does not yet have an officially disaggregated greenhouse gas (GHG) emission inventory for the health sector down to the hospital level. Estimates by Health Care Without Harm and Arup show that Indonesia's health-sector carbon footprint in 2014 reached approximately 13.6 million tons of CO₂e, or about 1.9 % of total national emissions. However, this figure is derived from modeling based on national health expenditure data and the World Input-Output database, not from actual emission measurements at each health facility.

The absence of such data hinders the formation of accountable decarbonization policy. Hospitals should ideally conduct emission inventories based on Scope 1 for direct emissions, Scope 2 for purchased energy, and Scope 3 for the supply chain, including pharmaceuticals, medical devices, food, transportation, construction and waste. Without a uniform baseline and methodology, emission reduction targets, financing needs, and hospital decarbonization achievements cannot be objectively set and evaluated.

2.3.2 Net-Zero Emissions and the Position of the Health Sector

Indonesia positions the achievement of net-zero emissions by 2060 or sooner as the direction of its national climate policy. In the context of hospitals, net-zero emissions must be interpreted as a real and phased effort to reduce emissions through energy efficiency, renewable energy, low-emission waste management, and sustainable procurement and

supply chains. The use of carbon credits or offsets should only be applied on a limited basis to residual emissions that cannot yet be technically reduced.

The health sector does not yet have specific mitigation targets, emission reduction pathways, or net-zero indicators. Thus far, the health sector has predominantly been positioned as a climate change adaptation sector, for example through the resilience of health facilities to disasters, energy disruptions, and climate-related diseases. This absence of sectoral targets creates a gap between the national net-zero target and the energy-intensive operational activities of hospitals that depend on high-emission supply chains.

2.3.3 Carbon Economic Value and Its Implementation Limitations

Indonesia's Carbon Economic Value (NEK) framework has been strengthened through Presidential Regulation Number 110 of 2025 on the Implementation of the Carbon Economic Value Instrument and National Greenhouse Gas Emission Control. NEK essentially assigns economic value to each unit of GHG emission and can be implemented through carbon trading, performance-based payments, carbon levies, and other mechanisms in accordance with the development of national policy. This instrument is intended to support the achievement of NDC targets and national GHG emission control.

Although Indonesia's carbon trading infrastructure has developed, including through the Indonesia Carbon Exchange or IDXCarbon, the implementation of compliance mechanisms still primarily focuses on the power sector. Hospitals have not yet become a sector with emission allocations, emission caps, specific reporting obligations, or carbon unit surrender obligations. Thus, NEK has not yet functioned as a decarbonization instrument for the health sector.

In its initial stage, the application of NEK to hospitals should be more appropriately directed as an incentive instrument rather than a burdening instrument. The government can provide grants, concessional financing, tax incentives, or green procurement support for hospitals that conduct energy audits, install renewable energy, improve cooling system efficiency, and reduce waste emissions. Once an emission baseline and MRV system have been established, emission reduction obligations can be applied gradually to large hospitals, referral hospitals, and government-owned hospitals.

2.3.4 Direct Regulatory Instrument: Legal Mandate as the Foundation of Accountability

The effectiveness of a legal mandate is proven in the UK NHS model through the Health and Care Act 2022, which sets enforceable net-zero emissions targets for 2040 (Scope 1 and 2) and 2045 (Scope 3). This mandate has successfully reduced emissions by 68 % since 1990 because it is embedded in primary legislation, has quantitative targets with interim milestones, and covers the entire value chain including the supply chain.

In contrast, the absence of a similar mandate in Indonesia—where Law No. 32 of 2009 on Environmental Protection and Management (UUPPLH) and Government Regulation No. 22 of 2021 on the Implementation of Environmental Protection and Management have not yet regulated specific hospital emission reporting—creates an accountability vacuum. Therefore, recommendations for direct regulation must include:

- a) Mandatory GHG emission reporting based on the GHG Protocol

The government needs to issue implementing regulations (a Minister of Health Regulation or a Minister of Environment and Forestry Regulation) requiring all hospitals

(or beginning with Class A and B hospitals and referral hospitals) to report GHG emissions periodically (annually) using the GHG Protocol methodology for Scope 1, 2, and 3 (as a priority). This reporting should be a requirement for the renewal of operational licenses or environmental permits, creating a strong regulatory stick.

b) Net-zero emission building standards for new hospital construction

Technical regulations (e.g., hospital building design standards) need to be revised to require new hospitals to meet high energy efficiency standards (e.g., EDGE Green Building certification or equivalent), use on-site renewable energy (solar panels, biogas) or off-site renewable energy (renewable energy certificates), and implement climate-responsive design (natural ventilation, green roofs, rainwater management).

c) Green public procurement (GPP) requirements

Public hospitals (and hospitals receiving government subsidies) are required to implement GPP with a minimum sustainability weighting of 10-15 % in the procurement of goods and services (adopting the NHS and European Union models). This includes supply chain emission criteria for pharmaceuticals, medical devices, food, and laundry/transportation services.

d) Integration with KARS accreditation

The national Hospital Accreditation Standard (SNARS) managed by the Hospital Accreditation Commission (KARS) needs to be revised to integrate environmental sustainability standards equivalent to the JCI Global Health Impact (GHI) chapter. Currently, KARS requires hospitals to have wastewater discharge permits (IPLC) and hazardous waste (B3) permits, but it does not include GHG emission audits or emission reduction targets.

2.3.5 Economic Instruments: Carbon Pricing and Fiscal Incentives

Regulation must be supported by strong economic signals to accelerate the transformation. Indonesia has issued Presidential Regulation No. 110 of 2025 on the Implementation of the Carbon Economic Value (NEK) Instrument and National Greenhouse Gas Emission Control, which includes carbon taxes, carbon emissions trading, performance-based payments, and internationally traded mitigation outcomes. However, the application of the NEK instrument to the health sector still requires further operationalization.

The design of economic instruments for hospitals includes:

a) Phased carbon tax with an earmarking mechanism

Hospitals could be subject to a phased carbon tax (starting with a low rate, e.g., IDR 30,000/tCO₂e, then predictably raised to IDR 100,000-150,000/tCO₂e by 2035) for Scope 1 and 2 emissions exceeding a certain threshold (e.g., 5,000 tCO₂e/year), which covers the regressive burden. Carbon tax revenue can be earmarked to fund energy retrofit grants, renewable energy subsidies, or concessional financing schemes for regional hospitals and small hospitals with limited fiscal capacity.

b) Fiscal incentives: grants, tax credits and concessional financing

The government can provide direct grants or tax credits (corporate income tax or local tax reductions) for hospitals that make decarbonization investments, such as installing energy panels (e.g., AC inverters, LED lighting) or replacing conventional incinerators with low-emission gasification or autoclaving technology.

c) Green Public Procurement policy with a sustainability weighting

The procurement of goods and services by public hospitals needs to integrate sustainability criteria (e.g., supply chain emissions, environmental certification, circular

economy) with a minimum weighting of 10-15 % in tender evaluations (adopting the European Union and NHS models). This will systemically transform the structure of the health supply chain market, encouraging manufacturers of pharmaceuticals, medical devices, and services to decarbonize their operations in order to remain competitive.

2.3.6 The Just Transition Principle: Protecting Service Access and Health Workers

Hospital decarbonization must be framed by the principle of Just Transition, which ensures that the transformation does not compromise access to health services for vulnerable groups or disproportionately burden health workers. The Just Transition principle, which originated from the labor movement and has been adopted in the Paris Agreement and the ILO's Guidelines for a Just Transition towards Environmentally Sustainable Economies and Societies for All, emphasizes that the transition to a low-carbon economy must protect livelihoods and workers' rights, including decent work instruments, retraining (reskilling), and social protection; ensure that access to basic services (health, education, energy) is not disrupted by mitigation policy; and involve stakeholders (workers, civil society, government, private sector) in the decision-making process.

In the context of hospital decarbonization, the Just Transition principle is translated into the protection of health service access, training and protection for health workers, and the application of the CBDR-RC principle at the national level.

2.3.7 Legal Roadmap 2025-2045: Phases and Instruments

The legal transformation of hospital decarbonization requires a phased approach that is realistic and adaptive to the capacity of developing countries. The following roadmap sets out the main phases with legal instruments, actors and success indicators:

Phase 1 (2025-2030): Legal Foundation and MRV System

- a. Legal instruments: Revision/issuance of Minister of Health Regulations and Minister of Environment and Forestry Regulations requiring hospital GHG emission reporting (starting with Class A and B hospitals); integration of sustainability standards into SNARS (KARS accreditation); issuance of technical guidelines for emission audits based on the GHG Protocol.
- b. Economic instruments: Launch of grant or tax credit programs for hospital energy retrofits; ETS or baseline-and-credit pilot projects for 50-100 large hospitals.
- c. Capacity: Training of hospital emission auditors (at least 500 nationally certified auditors); development of a hospital emission registration platform integrated with the National Climate Change Control Registry System (SRN-PPI).
- d. Indicators: 50 % of Class A and B hospitals report baseline emissions; 10 % of hospitals have an emission reduction action plan; 20 % of newly built hospitals are constructed to net-zero-ready standards.

Phase 2 (2031-2040): Regulatory Implementation and Integration of Economic Instruments

- a. Legal instruments: Expansion of the reporting mandate to all hospitals; integration of emission reduction obligations into operational licenses (target reduction of 20-30 % from the 2030 baseline); application of administrative sanctions for non-compliant hospitals.
- b. Economic instruments: Implementation of a phased carbon tax (IDR 50,000-100,000/tCO₂e) with earmarking for a health decarbonization fund; expansion of GPP with a

15 % sustainability weighting; mobilization of GCF financing or blended finance for a national hospital decarbonization portfolio.

- c. Capacity: Accreditation of national health institutions (e.g., the Ministry of Health or BPJS Kesehatan) as a GCF Accredited Entity to access global climate financing.
- d. Indicators: 80 % of hospitals report emissions; 30 % of hospitals achieve emission reductions of more than 20 %; 50 % of new hospitals achieve net-zero emissions.

Phase 3 (2041-2045): Acceleration of Action and Achievement of Net-Zero

- a. Legal instruments: A mandate to phase out fossil energy use in hospitals (except for emergency backup generators); a national net-zero emissions target for all public hospitals; full integration of JCI GHI standards into SNARS.
- b. Economic instruments: Implementation of a full carbon tax (IDR 150,000/tCO₂e); premium incentives for hospitals that achieve net-zero earlier; large-scale green bonds to finance the transition.
- c. Indicators: 100 % of hospitals report emissions; 70 % of public hospitals achieve net-zero across Scope 1, 2 and 3, including the supply chain.

2.3.8 Actors and Institutions: Cross-Sectoral Coordination

Implementation of this roadmap requires strong cross-sectoral coordination. A Health Decarbonization Technical Unit needs to be established under the Ministry of Health (or as an inter-ministerial coordinating body involving the Ministry of Health, the Ministry of Environment and Forestry, the Ministry of Finance, and Bappenas) with a mandate to coordinate the implementation of decarbonization regulations, and manage the emission registration platform and national database. The unit would also provide technical assistance and training for hospitals; access and channel international climate financing (GCF, bilateral, philanthropic); and monitor and evaluate progress toward the health sector's decarbonization targets.

Partial conclusion for RQ3: The legal reconstruction of hospital decarbonization in Indonesia requires a phased MRV obligation, integration of emission indicators into licensing and accreditation, economic incentives for low-carbon investment, and Just Transition protections. Its success depends on credible data, cross-sectoral coordination, inclusive financing, and a commitment to maintaining access to health services.

2.3.9 Integrated Legal Pathway and Indonesia's Roadmap

The optimal synthesis is a policy-mix approach that integrates net-zero emissions regulatory mandates, carbon pricing incentives, and social protection. In Indonesia, this legal transformation roadmap must include:

- a. Regulatory revision by integrating the health sector's 2050 net-zero emissions target into the Enhanced NDC and revising Government Regulation No. 22 of 2021 to require GHG assessment within hospital environmental impact assessments (AMDAL).
- b. An operational mandate by issuing a Minister of Health Regulation requiring emission reporting, a 2030 net-zero emissions roadmap, and making climate compliance a condition for operational licenses, adopting the UK Health and Care Act model.
- c. Economic support by expanding the Harmonization of Tax Regulations Law (UU HPP) to cover hospital emissions with a mechanism earmarking carbon tax revenue as decarbonization grants.
- d. Institutional and financing arrangements by establishing a Decarbonization Technical Unit within the Ministry of Health and accrediting national health institutions to access the Green Climate Fund.

- e. Just Transition by ensuring that this transformation does not compromise UHC service access, through phased implementation, cross-subsidies, and retraining for medical and health personnel.*

3. CONCLUSION

The framework for hospital decarbonization cannot fundamentally be separated from the state's climate obligations. The evolving interpretation of state obligations reinforces the demand that mitigation must cover all relevant sectors, including health, and requires regulatory action against emissions from non-state actors under a state's jurisdiction. On the operational-technical side, WHO guidance provides implementation parameters for climate-resilient and environmentally sustainable health facilities, but its effectiveness depends on adoption into binding national and sectoral legal instruments.

In the Indonesian context, although the environmental planning framework and carbon economic instruments have been strengthened through recent regulations, the regulation of hospital emissions still faces three gaps: (i) the absence of a standardized hospital emission MRV mandate connected to licensing; (ii) institutional fragmentation and weak enforcement mechanisms across the health and environmental sectors; and (iii) limited capacity and transition financing.

Hospital decarbonization requires legal reconstruction based on a mix of instruments: information obligations (MRV), economic instruments (incentives/green procurement/financing access), and strengthened enforcement and Just Transition protections so that the transition does not compromise access to services and to health workers.

RECOMMENDATIONS:

- 1) Mandate hospital emission MRV: establish a phased obligation for hospital emission inventory and reporting (starting with large and referral hospitals) using standardized methodology and independent audits.
- 2) Integrate with licensing and accreditation: make MRV compliance and emission reduction plans a requirement for the renewal of operational/environmental permits, aligned with Ministry of Health guidance instruments.
- 3) Utilize the carbon economic value instrument: use the NEK framework to design hospital emission reduction incentives (e.g., energy retrofits, renewable energy, cooling system efficiency) with MRV as a prerequisite for data integrity.
- 4) Just Transition in the health sector: ensure that the design of incentives and obligations does not regressively drive up the cost of services; prepare support schemes for regional hospitals and capacity building for emission-audit human resources.
- 5) Roadmap 2025-2045: establish phases (data foundation regarding targeted obligations integrated with procurement/supply chains) toward gradual net-zero with monitorable indicators.

CONFLICTING INTEREST STATEMENT

The authors state that there is no conflict of interest in the publication of this article

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